A SAGE CONSENSUS DOCUMENT

FINAL SCOPING DOCUMENT

EASTSIDE TYPE F RIPARIAN ASSESSMENT PROJECT

CMER

Scientific Advisory Group for the Eastside (SAGE)

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Introduction

The purpose of this document is to describe the results of the scoping process for the Eastside Riparian Assessment Project. The scoping process was undertaken to:

1) Determine objectives and critical questions the study will be designed to cover.
2) Define the types of data needed to answer these questions.
3) Evaluate potential research approaches to collect the data.
4) Recommend a preferred research strategy.

This project is being developed by the Scientific Advisory Group for the Eastside (SAGE). It is one part of SAGE's Eastside Type F Riparian Program (Appendix 1) that was passed by consensus in SAGE on 3-9-04. This program is included in the CMER 2005 fiscal year work plan (CMER, 2004).

Issue Statement

There is much uncertainty concerning the status of Eastern Washington riparian forests and appropriate strategies for their management. Eastern Washington encompasses a large land area with a wide range of climatic and physiographic conditions. Consequently, the forested portions of the Eastern Washington landscape are characterized by a great diversity of vegetative communities. This diversity appears to be accentuated in riparian areas by factors such as strong moisture gradients, microclimate, unique disturbance regimes and differences in past management. Little riparian-specific research has been conducted in Eastern Washington, especially on forest land regulated under the state Forest Practices Rules.

The goal of the eastside Type F riparian prescriptions is to create riparian stand conditions that meet three objectives: 1) provide riparian functions needed for recovery of fish and stream associated amphibian populations, 2) maintain riparian stands within the range of conditions associated with historic disturbance regimes, and 3) maintain riparian stands within a range of conditions that minimize risk of catastrophic damage from insect fire, and disease. A set of management prescriptions were developed by eastside forest and aquatic resource managers to achieve these objectives during negotiation of the Forest and Fish Report (FFR) rule package. The prescription packages created a classification system that places riparian stands into one of three timber habitat types based on elevation zone. Specific riparian management zone widths and harvest management prescriptions were developed for each timber habitat type. The riparian prescriptions are based on two principles: 1) no harvest within 30 feet of the stream to avoid disturbance of fish and water quality, and 2) active harvest management of stands within the inner zone to increase the size of trees, favor species resistant to fire, disease and insect damage, and maintain stand basal area within a range that avoids triggering forest health problems. Due to a lack of data on current and historic riparian stand conditions and disturbance regimes, the classification system, the management prescriptions and the basal area ranges were largely drawn from the professional judgment of managers with experience in eastside forests and existing data from upland stands.

The Scientific Advisory Group for the Eastside (SAGE) has been assigned the task of validating the eastside riparian prescriptions for fish bearing (Type F) streams as part of the Forest and Fish Adaptive Management Program. This issue has been assigned a high priority by CMER due to a high level of scientific uncertainty with the prescriptions and the potential risk to aquatic resources (CMER 2004). Designing a strategy to validate the prescriptions has been a complex and challenging task due to the diversity of riparian stands, the multiple (and potentially conflicting) objectives of the eastside riparian prescriptions, and the dearth of quantitative data on eastside riparian stands, their functions, and their response to management.

Relationship of this Project to FFR Adaptive Management

The riparian assessment project proposed in this document is only one part of an ongoing program SAGE is implementing to validate the eastside Type F riparian prescriptions.

Role of this Project in the Eastside Riparian Type F Program

The Eastside Riparian Type F strategy includes several projects (Figure 1). Together, these projects will address validation of the Eastside Type F riparian prescriptions.

The purpose of the first three projects (Figure 1, # 1-3) is to determine or validate the range of riparian stand conditions necessary to meet the prescription objectives: (e.g. maintain stands within historic ranges associated with eastside disturbance regimes, avoid catastrophic damage due to disease or insects, provide riparian functions for recovery of fish and amphibian populations). This component requires data on:

a) Relationships between riparian stand conditions, riparian functions (e.g. shade, wood and organic material input, and the response of fish and amphibian populations.
b) Range of stand conditions associated with historic disturbance regimes.
c) Relationships between riparian stand conditions and insect or disease outbreaks.

SAGE began work on this portion (# 1-3) of the Eastside Type F Riparian strategy with a literature review on disturbance regimes designed to identify and examine existing data on the range of riparian stand conditions associated with historic disturbance regimes in eastern Washington. Two projects are currently underway which will provide information on the relationships between riparian stand conditions and the functions they provide. They include a review of literature on eastside LWD functions and the eastside temperature nomograph project, which will clarify the relationship between riparian shade and stream temperature. No work is currently underway to define the relationships between riparian stand conditions and insect or disease outbreaks.

The focus of this document is the Eastside Riparian Stand Assessment (Figure 1, # 4), which is designed to document the current range of conditions of riparian stands on eastside forest lands. Information gathered through this project will provide CMER and FFR with a common understanding of status and characteristics of riparian stands in lands managed under the eastside Type F prescriptions. The data will be queried to identify patterns in the distribution of riparian stand types across eastern Washington, and relationships between riparian stand conditions and factors such as precipitation, elevation, geology.

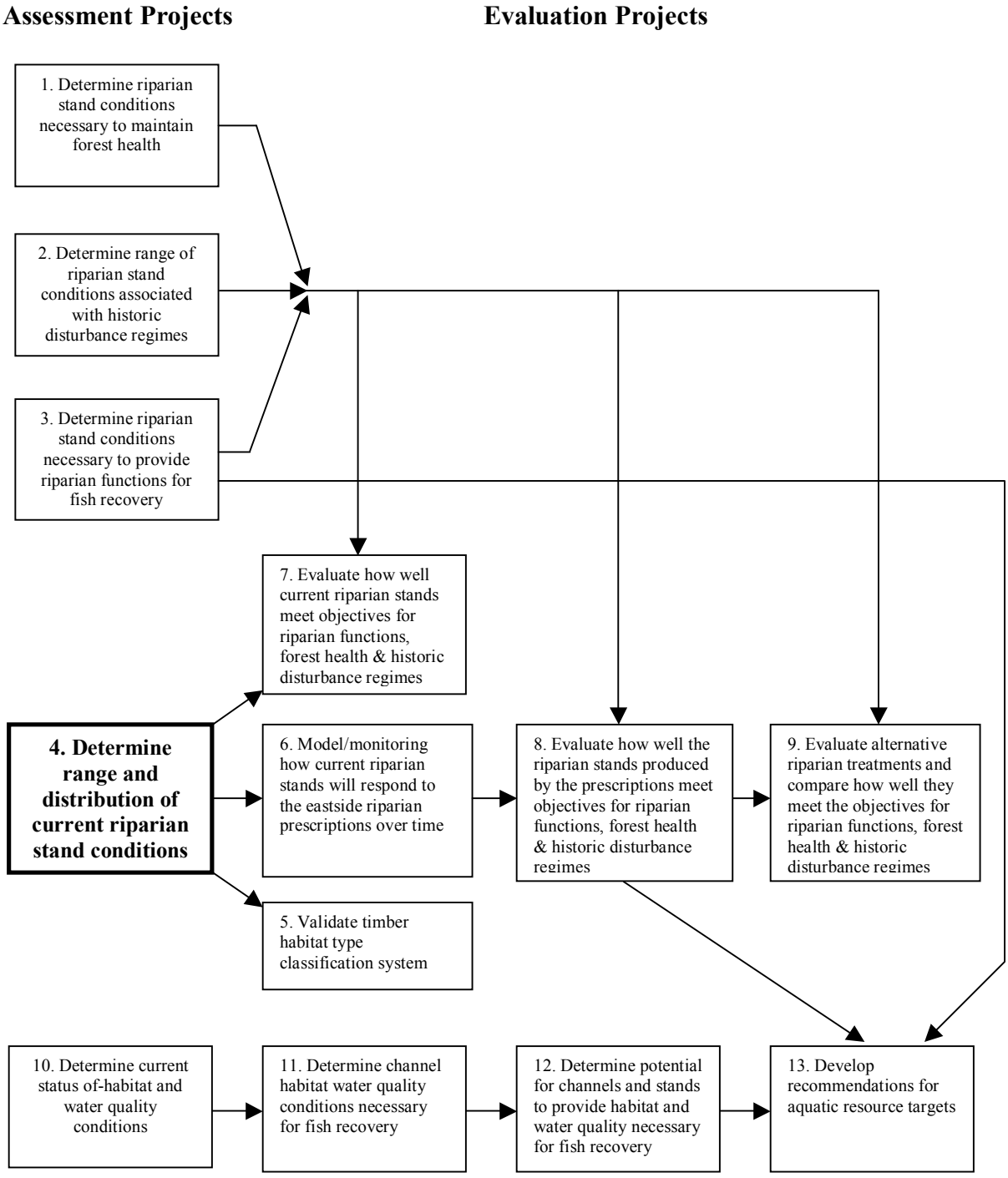

Figure 1. Relationships between project components of the Eastside Riparian Type F Program.

Data on the distribution of riparian stand types from the Eastside Riparian Stand Assessment Project will be used in several other validation projects. For example, data on current riparian stand conditions can be used to validate the fit between the timber habitat type classification system and the distribution of riparian stand types across the landscape (Figure 1, #5). This project will identify areas where the system could be adjusted to provide a better fit with regional or localizes patterns in the spatial distribution of riparian stand types. Another project (Figure 1, #6) will evaluate current riparian stand conditions in context of the results of the first three projects to evaluate the extent to which current riparian stands achieve the three FFR eastside riparian objectives (provide necessary riparian functions, are within the range of historic stand conditions, are at risk for catastrophic damage due to disease or insect outbreaks). It will also identify the type and extent of stand conditions that require active management to meet FFR objectives. A third project will use either a modeling or monitoring approach to estimate or determine how the trajectory of current riparian stands will be affected by application of the eastside riparian prescriptions (Figure 1, #7), and to evaluate how well future riparian stands shaped by the prescriptions will meet FFR objectives (Figure 1, #8). In the future, the strategy may also involve manipulative studies that compare the effectiveness of a range of riparian management prescriptions (Figure 1, #9). In addition, data from the eastside riparian stand assessment could provide a framework for designing sampling plans for eastside effectiveness monitoring projects.

Relationship of the Project to Schedule L-1 and L-2

This project, along with related elements of the Eastside Riparian Type F Program, will help address several issues raised in Appendix L of the Forest and Fish Report (USFWS and many others, 1999). The project will inform two key questions concerning the overall performance goals, including:

- Q2 - Will the prescriptions produce forest conditions and processes that achieve the performance target in appropriate time frames?

  This project will measure the natural spatial and temporal variability within the eastside riparian forest stand ecosystems. The measure of current stand condition will establish reasonable timeframes to achieve targets and trajectories.

- Q3 - Are the targets the right ones to achieve the resource objectives?
  This project will contribute to the strategy to answer this question. This study will help address questions concerning the FFR resource objectives for heat/water temperature and LWD/organic inputs. The project will document relationships between riparian shade and the conditions in adjacent forest stands. The study will also test the assumption of eastside tree heights as defined by all available shade at different secession stages. This project will provide data that contributes to the strategy to validate the eastside stand condition ranges and determine if current stands are on the pathway to achieve these standards.

The project will also address several Schedule L-2 questions specific to the eastside:

- LWD 1: Validate assumptions; models and data used to develop Desired Future Condition targets and eastside stand conditions. Conduct field reconnaissance of mature riparian reference stands and compare results with interim targets. This study

will contribute to the strategy to identify stand conditions which meet the eastside riparian resource objectives. .

- LWD 4: Determine rates of natural regeneration and tree mortality in riparian management zones and their effects on the ability of management prescription to provide riparian function(s), including LWD recruitment. Identify practices to reduce adverse impacts. This project will provide data on current stand conditions including regeneration and tree mortality indicators.
- LWD 5: Assess the historical ranges of conditions and disturbance regimes of the eastside riparian ecosystems. Information from this project of current conditions coupled with that found in the disturbance regime synthesis will answer this question.
- LWD12: Test the effectiveness of trees in the outer buffer (outer zone) in contributing LWD to streams. The study will provide data on tree height from the outer zone under current conditions and relate that to potential LWD recruitment.

Objectives, Critical Questions and Data Requirements

The objectives and critical questions presented below were based in part on "Eastside Riparian Prescription Validation Briefing and Scoping Document" (Schuett-Hames, 2002), the "Forest and Fish Report" (USFWS and many others, 1999) and specific questions from Appendix L1 and L2 of the Forest and Fish Report (Heide, 2000). Each objective is followed by the critical questions it will address. The type of data necessary to answer the critical questions is also indicated.

Objective 1: Determine range and distribution of current riparian stand conditions.

- What are the current characteristics of riparian stands in eastern Washington?
  - What is the frequency distribution of forest stand attributes?
  - Are there regional patterns or differences in riparian stand characteristics across eastern Washington?
  - To what extent do current riparian stands meet the size and basal area thresholds for timber harvest across the regulatory habitat types (elevation bands)?
  - What forest series and plant association groups are represented in riparian stands?

Data: Live tree/snag diameter, height; species; distance from stream, basal area, trees per acre; tree age (cores for growth basal area), percent canopy closure in stand and above stream; live crown ratio, canopy class, decay class, downed wood volume, seedling and sapling regeneration data, snags and decay class, stocking rates.

Objective 2: Determine the relationship between site characteristics and riparian stand attributions.

- How do the characteristics of the study sites (e.g. physiography, geology, climate, and channel or valley morphology) affect the distribution and characteristics of riparian stands?
  - What, if any, significant relationships exist between site characteristics and riparian stand attributes?
  - How do site characteristics influence the distribution and characteristics of eastside riparian stands?

- Are there differences in riparian characteristics in different eco-regions?
- Is the current riparian timber habitat type classification system valid?

Data: Elevation; aspect; stream direction; valley confinement; precipitation class; slope, landform; geology.

Objective 3: Determine the effect of proximity to the stream on the characteristics of eastside stands.

- How does proximity to stream influence the characteristics of eastside stands?
  - Are there differences in the forest series and plant association groups (PAG) between stands in close proximity to the stream and those more distant?
  - Are there differences in other stand characteristics associated with distance to the stream?

Data: Kovalchik's riparian classifications system and the appropriate USFS plant association groups. Distance from stream of individual trees.

Objective 4: Determine the frequency and distribution of mortality and insect and disease effects in eastern Washington riparian stands.

- What is the extent of tree mortality, breakage and other physical disturbances in riparian stands in eastern Washington?
  - How widespread are insect and disease effects in East side riparian zones?
  - What are the characteristics of snags and diseased or damaged trees?
  - Is there evidence of a relationship between stand characteristics, physiographic, climatic factors, management activities and tree mortality?

Data: Volume of downed wood and standing dead trees; species; distance from stream; decay class; percent mortality, causal agent (insects, disease, wind throw, ice, top breakage). Elevation; aspect; stream direction; valley confinement and precipitation class.

Objective 5: Document management practices and other disturbance factors that affect eastern Washington riparian stands.

- What factors are influencing riparian stands in eastern Washington?
  - How do past or current management activities (e.g. fire suppression, harvest, grazing, road construction, timber harvest) influence current riparian stand conditions?
  - What other processes (e.g. beaver, fire, noxious weeds) influence current riparian stand conditions?

Data: Evidence of grazing by livestock; past and current timber harvest practices; buffer zones; fire scares; noxious weeds; fire and fire suppression; and beaver activity past and present.

Study Approach

Several approaches were evaluated for determining current riparian stand conditions on the eastside. The options included; 1) using existing data, 2) using remote sensing data, 3) collecting field data, or 4) a combination of remote sensing and field data. A brief summary of the discussion about each option follows:

Existing data

This option would use existing data to characterize eastside riparian conditions. Examples of data sets that could possibly be of use would be data from US Forest Service inventory or research plots (Townsley; Kovalchik), data from DNR resource inventory plots, inventory data from large forest landowners and Forest Inventory and Assessment (FIA) plot data and watershed analysis data.

Some potential advantages of using existing data include:

- Cost effective and quick if data meets the needs of the study.
- May become more accessible data within the realm of CMER; build cooperative networks with others that need similar data.
- May be source of data on federal lands.

Some potential disadvantages include:

- Data quality variable (precision, accuracy, completeness).
- Issues of compatibility and comparability of data sets.
- Questionable availability of riparian data or ability to separate out riparian stand data from upland areas.
- Most inventories set up for coarse screen; we want a fine screen data set.

Since existing data was collected by various organizations for many purposes, there are many unanswered questions about the data including:

- Is coverage available across the entire study area in eastern Washington?
- How compatible are the sampling design, parameters and methods between datasets?
- Can data from riparian stands be distinguished from adjacent uplands (resolution)?
- Are the desired or necessary parameters included in all the datasets?

Further investigation is needed to identify the potential data sets, examine the coverage, and address compatibility and resolution issues. One potential use of existing data is to assess of the range of current riparian stand conditions, and a measure of variability for estimating sample size. It could also be used to assess the range of variability in riparian stands outside FFR lands. This approach may be best suited as and additional project to collect and synthesized the found data. That information gathered will help inform whether non-forest and fish lands need to be sampled in the future.

Remote sensing

This option involves using remote sensing data to assess current riparian stand conditions. Some field validation would likely be necessary. Potentially useful remote sensing data includes aerial photography, satellite imagery and LIDAR.

Some potential advantages include

1. Little fieldwork (just validation) for remote sensing.
2. Resource-scale aerial photos (approximately1:12,000) are readily available.
3. Can obtain a larger sample size for the dollar.
4. Provides a permanent record of current baseline conditions, can create a digital data base that is GIS compatible.
5. Can use same method for re-sampling as photos are re-taken in the future.

Some potential disadvantages include:

- May require a high level of expertise in photo interpretation.
- Resource photos and satellite imagery probably don't provide adequate resolution to obtain all the parameters necessary.
- Cost of acquiring historic records, photos from the past are expensive.
- Accuracy and scale quality may vary.
- Issues of compatibility of scale and date of imagery when combining aerial photos from different organizations and regions.

The full extent of remote sensing data available for the eastside is unknown. Aerial photos used by DNR, forest landowners and USFS for resource assessment (approximate scale of 1:12,000) are probably available across the entire eastside, but may differ somewhat in scale, type (color, black and white) and date of flight. Resource scale photos can be used to produce a coarse, watershed analysis level evaluation of riparian stands, based on estimates of density (dense vs. sparse), type (conifer, mixed, deciduous) and size. This may be useful for screening or stratification purposes. However, it is unlikely that quantitative data on species composition, density, basal area, and height could be collect from resource-scale aerial photographs or satellite imagery. Low altitude aerial photography could provide more detailed data. The availability of existing low altitude photography is unknown, but probably is restricted to special project areas. Contracting for high resolution, low altitude photography (i.e. scale of 1:2000) is a possible alternative to field data collection.

Field collection of stand data

This option would involve sending field crews to collect data at a sample of eastside riparian sites. Field data collection would provide detailed data on stand composition, tree species, diameter, basal area, tree heights and ages that would be difficult to obtain elsewhere.

Some potential advantages include:

- Data would be current.
- Parameters and sampling plan can be tailored to study design requirements.
- Data set will be consistent due to standardized methods and parameters.
- Can choose appropriate level of resolution.

Some potential disadvantages include:
- Costs may be higher.
- Would require a multi-year effort.
- Contractors would have to be very organized and logistics well planned.

Other Issues

Several other issues pertaining to the project and study design were also addressed during the scoping process. These are discussed briefly below.

Collecting both stand and stream channel/habitat data at the same sites

While the main focus of the project is to document current riparian stand conditions, it would be possible to collect data on related channel conditions such as shade, wood abundance and characteristics, pool habitat and physical channel characteristics (width, depth, and channel type, gradient). Such data would be useful in documenting variability in conditions such as in-channel shade, wood loading and pool habitat availability. It could also potentially be used to explore relationships between stand conditions, riparian functions and in-channel habitat conditions.

Some potential advantages of collecting both stand and stream data include:
- May be cost effective for one visit compared to multiple entries.
- Better correlation between stand condition and stream condition, same location.
- Could have a cross functional team for data collection.
- Better linkage of stand condition and input for stream condition and function with actual field data.

Some potential disadvantages include:
- Complexity of study design and logistics.
- More time per site required.
- Human resource issues (crew expertise and training).
- Increased project costs.
- Limits options for other sampling methods, remote sensing.

Further scoping of this issue is planned by SAGE.

Assessing FFR lands vs. all eastside forest lands

Another issue addressed in the scoping process was whether to restrict the study to FFR lands or to include all forested eastside lands (including federal and tribal lands, and areas covered by HCPs). Restricting sampling to FFR lands would meet the objective of characterizing the portion of the riparian landscape being managed under the FFR eastside prescriptions. Expanding the sampling to all eastside forest lands would include a broader range of eastside physical and climatic settings, as well as a broader range of management practices associated with federal and tribal lands. This option would provide a more comprehensive picture of the range of riparian conditions across the entire eastside. This issue may be informed by using existing data from federal, state and Tribal sources. If this proves not to be the case and the information is required to understand eastside condition then an additional study may be undertaken. A major argument for adding all forestlands concerns unmanaged stands. If the current stand

condition assessment indicates that this is a stratum of high concern then a study may be instigated that targets unmanaged stands.

Some potential advantages of sampling FFR only include:

- Less cost, smaller scale study
- Study on only lands associated with forest practice rules
- Cooperation among FFR stakeholders

Some potential disadvantages of sampling only FFR lands include:

- Few mature riparian stands on FFR lands
- Some forest communities may not occur on FFR lands
- Will not characterize the entire range of conditions in eastern Washington.
- Will not document relationships between upstream riparian stands on federal lands and downstream fish habitat on FFR lands.

Potential advantages of sampling all eastside forest lands:

- More comprehensive assessment of range of eastside riparian conditions
- Will provide a larger sample of unmanaged riparian stands and potential reference conditions.

Potential disadvantages of sampling all eastside forest lands:

- Much larger area to sample
- Larger project cost
- Will require cooperation of non-FFR landowners (USFS, tribes)

Pilot study

Another issue discussed was whether it to start implementation with a pilot study, or launch immediately into full scale sampling. The benefits of a pilot study are the ability to test the sampling design, data collection methods, data analysis on a limited scale and incorporate changes before committing to a full scale sampling effort. If properly designed, the pilot data can be incorporated into the larger study that follows. A pilot study would also provide data needed to estimate the sample size of the full-scale sampling effort. Some disadvantages of a pilot study are additional delay in implementing the full scale sampling effort (and obtaining results) as well as concerns about potential misinterpretation or misuse of pilot study results in the adaptive management process. SAGE decided that the sampling methods were robust and did not require a pilot study. Therefore, the benefits of a pilot study could best be achieved through a phased implementation of the study. The goal of phase I is to develop an estimate of sample size and evaluate whether sampling outside of FFR lands is necessary to characterize the complete range of variability in eastside riparian stands.

Potential applications of modeling

The role and application of riparian stand models in the study approach was also discussed. There is an opportunity to use specific modeling applications such as Forest Vegetation Simulator (FVS) to achieve some program goals. For example, data on current riparian stand conditions could be used to model potential stand response to the

FFR riparian prescriptions and to project future stand conditions. Modeling would be accomplished in the analysis phase of the project or as a separate project.

Some potential advantages of modeling include:

- Uses existing data from assessment project.
- Grow trees over time and show linkage over time.
- Testing existing models or improving them to fit in eastern Washington.
- Provides input for field effort, test results in the field.
- Quicker results and evaluation compared to monitoring over time.

Some potential disadvantages of modeling include:

- There are questions concerning model validation and calibration for eastern Washington riparian stands.
- Lack of eastern Washington data on current conditions as starting point for modeling.
- Over simplification of stand response.
- Some models have inherent assumptions not suitable for riparian zones**,** may kill too many trees and does not account for deciduous species.
- Not based on correct habitat types and mortality processes.
- Error stacking if models are stacked.

Preferred Strategy

The preferred strategy for conducting this study is to use a phased approach. The first phase will consist of a limited, unbiased field sampling of riparian stand conditions on FFR lands only. The purpose of the first phase is to:

- Develop an estimate of the range of variability in eastern Washington riparian stands covered under forest and fish to determine sample size for the main sampling effort.
- Develop and test field methods.
- Test feasibility of implementing the sampling strategy.

The study design will be developed under contract under the guidance of SAGE and submitted to CMER for review, along with a recommendation concerning review by the scientific review committee.

Concurrent with the first phase, SAGE will investigate the availability of existing field or remote sensing data on eastside riparian stands and will use some of this data to evaluate the range of riparian stand conditions on non-FFR lands. Following completion of phase I, SAGE will have an estimate of sample size and information on the cost and feasibility of field sampling as well as the availability and suitability of existing data and remote sensing. At that time SAGE will make a decision on the best approach for implementation of the main sampling effort. Prior to finalizing the design for the main sampling effort, SAGE will also evaluate the need for additional sampling on non-FFR lands to characterize the full range of variability in eastside riparian stand conditions.

Timetable

The proposed time line was constructed with the expectation of starting the field portion of this study in DNR fiscal year 2006 (July 1, 2005).

February 10 – SAGE consensus to adopt Eastside Type F program and submit to CMER.
March 8 – First workgroup meeting to define Type F project held in the UCUT offices in Spokane.
March 9 – Submit requests to CMER for staff time or $60,000 to develop the project proposal. SAGE also requested staff time or $40,000 for sampling site selection.
March 23 – Request tabled by CMER with a request for more information about the project. CMER staff assigned to help SAGE in the scoping process (Dave Schuett-Hames).
April 23 – A second workgroup meeting to discuss the Type F assessment: current conditions critical questions.
April 26 and 27 – CMER special session and monthly meeting where budget figures for the requests mentioned above were accepted for inclusion into the Fiscal year 2005 budget.
May 10 – Type F workgroup convenes to discuss and write scoping document.
May 11- Workgroup requests SAGE inputs and approval of the direction the project is taking.
June 1 – Type F workgroup finishes scoping paper and send to SAGE membership.
June – SAGE accepts scoping paper by consensus.
June – SAGE presents projects to CMER which include two literature synthesis, nomograph project and Type F scoping.

July - Submittal to CMER of the scoping document.
July - Development of a Request for quotes and qualifications (RQQ)

SAGE chooses contractor for project development.
SAGE works with contractor to develop Type F project.
Submit project proposal to CMER for review and request comments
SAGE prepares questions and guidelines for SRC.
Send questions and guidelines to CMER with request to forward to SRC.

References

CMER. 2004. CMER Work Plan, FY2005. Washington Department of Natural Resources. Forest Practices Division. Olympia.

Heide, P. 2000. Draft Schedule L-2. Washington Forest Protection Association. Olympia.

Schuett-Hames, D. 2002. Eastside riparian prescription validation briefing paper and scoping document. Northwest Indian Fisheries Commission. Olympia.

US Fish and Wildlife Service and 11 other organizations. 1999. Forests and fish report. Washington Forest Protection Association. Olympia.

APPENDIX 1: Eastside Type F Riparian Program

CMER Work Plan
SAGE Eastside Riparian Type F Program

Summary of Eastside Riparian Rules:

Intent of Rule

Provide stand conditions that vary over time within a range that meets functional conditions and maintains general forest health. Specified riparian functions include bank stability, wood recruitment, leaf litter fall, nutrients, sediment filtering, and shade. More specifically, the eastside rules were intended to create a range of riparian characteristics that a) fall within the range of historical variability, b) are sustainable or not at unnaturally high risk of catastrophic failure, and c) provide the functions that support the production of harvestable populations of salmonids. The eastside rules vary with elevation. The intent of the elevation bands was to capture the variations in historical disturbance regimes.

Summary of Rule Strategy

The eastside Type-F riparian rules utilize required riparian buffers designed to provide the specified functions and meet the intent of the rule. Riparian areas are divided into three zones, a core zone, an inner zone, and an outer zone. The width of the core zone is 30 feet. No harvest is allowed within this zone. This is intended to protect bank stability and maintain the trees that have the greatest influence on streamside shade and are highly likely to recruit to streams. The inner zone is defined as 45 feet for streams less than 15 feet in width and 70 feet for larger streams. The inner zone is managed to meet the specified intent and objectives of the rule. The width of the outer zone varies with site class and ranges from 0 to 55 feet. The sum of the core zone, inner zone and outer zone approximates the length of a site potential tree, which varies with site class.

Allowable harvest within the inner and outer zones is different for each of three elevation bands, referred to as habitat types in the rules. These elevation bands were intended to reflect variations in natural disturbance regimes. Several management strategies are allowed in the inner zone, with the intent that the combined core and inner zones will place the stands on a trajectory that meets the objectives of the eastside rules (see 1.0 above). The management strategies for high elevation stands are similar to those for the Westside, with the exception that the width of the various zones is different. Management within the various bands includes a preference for leaving species of trees that were the dominant species under natural disturbance regimes.

Strategy
The eastside riparian strategy is designed to achieve three management objectives:

1) To create dynamic riparian stands and riparian processes that emulate those provided by natural riparian disturbance regimes,

2) To create healthy and sustainable riparian stand conditions and,
3) To create riparian stands that provides riparian functions necessary for the protection and recovery of salmon and aquatic amphibian species.

The Forest Practices Rules describe the management strategy as follows:

"For eastside forests, riparian management is intended to provide stand conditions that vary over time. It is designed to mimic eastside disturbance regimes within a range that meets functional conditions and maintains general forest health. These desired future conditions are a reference point on the pathway to restoration of riparian functions, not an end of riparian stand development" (WFPB,2001).

The Eastern Washington Type-F riparian rules are based on the following assumptions:

1) The management strategies in the Type-F rules will put stands in the RMZ on a trajectory that is within the range of natural variability.
2) The defined elevation bands are reasonably accurate reflections of the special distribution of historical disturbance regimes and species composition.
3) The management Strategies will minimize risk of catastrophic events
4) The management strategies will put stands on a trajectory that will provide riparian functions needed to support harvestable populations of fish.
5) The temperature overlays are necessary to provide stream temperatures that meet the state water quality standards and the needs for bull trout.

Uncertainties about the validity of the assumptions and the effectiveness of the rule lead to two critical questions and programs to address them. The critical questions for SAGE to address first are:

1) **What is the desired range of conditions for eastside riparian stands and what are the appropriate LWD performance targets?** This is titled *Eastside desired Future Range & Target Development Program* and the task type is listed as a Rule Tool.

2) **Can the shade/temperature relationships in the eastside temperature nomograph be refined?** It is titled *Eastside Temperature Nomograph Program* and also has Rule Tool task type.

To address these assumptions and critical questions, Sage has scoped and developed the following projects:

1. A **Disturbance Literature Review** has been undertaken to gain an understanding of what disturbance regimes existed in the past and how they affected riparian forests. This will help determine whether we can apply these past conditions to present riparian stands and meet the Desired Future Conditions for riparian function.

2. A **Large Woody Debris** L**iterature Review** is in progress to help gain an understanding of the dynamics of functional stream wood and to a lesser degree the linkage between the level of LWD recruitment and the health of aquatic habitat. Addressing the uncertainty will require additional information on the relationship of LWD recruitment and habitat function. There is uncertainty about the response to aquatic habitat to different types or levels of LWD input and loading, and consequently on how much LWD riparian buffers need to produce.

3. **Temperature Nomograph:** Develop an Eastern Washington specific nomograph using existing data and identify gaps for future study. This will identify site characteristic necessary to produce a better predictive model of stream temperatures in eastern Washington.

4. **Eastside Riparian Assessment Project:** Eastern Washington has a wide range of climactic conditions, elevations, forest types, riparian zones, and management history. Riparian health/function information over this range of conditions is limited. An evaluation, or baseline study, of current riparian forest stands is needed to determine whether they are meeting required functions for fish habitat and where they fit into the historical disturbance regime and/or current disturbance regime. This will also help to develop TARGETS to accomplish prescription assessment/evaluation.